S/135/60/000/011/009/016
A006/A001

Welding Cast 27ХГСНЛ (27KhGSNL) Steel With Low-Alloy Structural Steels

room temperatures. Results obtained were checked when welding individual cast units. The effect of preliminary heating on proneness to cracking during welding was examined. The parts were preheated to 250 - 300°C and 30 minutes after welding were subjected to low annealing at t = 650 - 700°C (holding time 15 - 20 min; air cooling). Then the units were quenched to 130 - 150 kg/mm^2 ultimate strength. The effect of welding-on during the repair of defects in weld joints and castings was specially studied. For this purpose annealed milled plates were manually butt-welded with NIAT-3M electrodes. The reinforcement was removed and the weld was built-up. The plates were not heat treated prior to welding. The built-up plates were quench-hardened to 130 - 150 kg/mm^2 ultimate strength by heating to 890 ± 10°C, oil cooling and tempering at 200 - 240°C. The weldability of dissimilar steels was determined by welding cast plates to plates cut-out from sheets in the following combinations: 27KhGSNL + 25KhGSA, 27KhGSNL + EI712, 27KhGSNL + 30KhGSA. After welding the specimens were quench-hardened and tempered at 200 - 240°C. The results of the investigations performed lead to the following conclusions: Cast 27KhGSNL steel plates may be successfully welded among themselves or with 25KhGSA, 30KhGSA and EI-712 steels

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S/135/60/000/011/009/016
A006/A001

Welding Cast 27ХГСНЛ (27KhGSNL) Steel With Low-Alloy Structural Steels

by automatic welding in carbon dioxide and under AN-348A flux; by manual electric-arc welding with NIAT-3M electrodes (Sv-08A rod); and by argon-arc welding process. For welding 1.5 to 4.0 mm thick specimens, it is recommended to use NIAT-3M electrodes which are more suitable from the technological point of view than VIAM-101 electrodes. Weld joints of 27KhGSNL steels with 25KhGSA and EI712 steels possess high strength at normal and elevated temperatures (350°C). There are 7 tables and 3 figures.

Card 3/3

S/135/62/000/006/002/014
A006/A106

12300

AUTHORS: Gorshkov, A. I., Engineer, Tret'yakov, F. Ye., Candidate of Technical Sciences

TITLE: The effect of operational parameters in argon-arc welding BT-14 (VT-14) alloy upon pore formation

PERIODICAL: Svarochnoye proizvodstvo, no. 6, 1962, 4 - 5

TEXT: The authors studied the effect of the welding speed, linear energy and voltage of the arc, and of the magnitude of gap, upon pore formation in the weld metal during automatic argon-arc welding of VT-14 titanium alloy plates, 2 - 3 mm thick. It was found that the basic cause of porosity is the presence of gases in the metal to be welded. With greater welding speed, arc voltage and gaps between the edges in automatic argon-arc welding without filler metal, porosity decreases in the weld metal: the thicker the metal, the fewer pores are formed. At a higher linear energy the amount of pores increases. Porosity in the weld metal increases if there is hydrogen in the shielding zone of the arc. In all the cases investigated, the pores had a round shape which indicates high

Card 1/2

gas pressure inside the pores. The pores are located in the unfused edges, in case of incomplete fusion of the welded edges. In the case of complete fusion, they are located in the weld-adjacent zone. It was found that of several methods tested, such as automatic and manual argon-arc welding, and atom-hydrogen welding, automatic argon-arc welding without filler metal produced welds with least amounts of pores. There are 3 figures and 1 table.

APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R001756530007-7"

NIKOLAYEV, G.A., doktor tekhn.nauk, prof.; TRET'YAKOV, F.Ye., kand. tekhn.nauk

Strength of titanium alloy structures. Trudy MVTU no.106:166-172 '62. (MIRA 16:6)

(Titanium—Welding)

LASHKO, N.F.; LASHKO, S.V.; TRET'YAKOV, F.Ye., kand. tekhn.nauk, retsenzent; OSIPOVA, L.A., red.izd-va; EL'KIND, V.D., tekhn. red.

[Some problems in connection with the weldability of metals] Nekotorye problemy svarivaemosti metallov. Moskva, Mashgiz, 1963. 299 p. (MIRA 16:4)

(Welding)

TRET'YAKOV, F. YE.

AID Nr. 990-1 14 June

POROSITY IN Ti-ALLOY WELDS (USSR)

Tret'yakov, F. Ye., and A. I. Gorshkov. Svarochnoye proizvodstvo, no. 4, Apr 1963, 24-27. S/135/63/000/004/007/012

The effect of various factors on the porosity in Ti alloy welds has been evaluated. Hydrogen contained in the base metal and filler wire was found to be the main cause of porosity. Pickling of the base metal increases somewhat the amount of hydrogen absorbed and therefore promotes porosity. The determinant effect of hydrogen in filler metal can be suppressed by a suitable alloying. For instance, welds made with OT4-1 filler [1.0-2.5% Al, 0.8-2.0% Mn] having a hydrogen content of 0.037% contained 3.5 times more pores than welds made with BT-15 filler [3% Al, 8% Mo, 11% Cr] having a hydrogen content only slightly lower (0.031%). The 48-T2 filler [composition not given], containing only 0.009% hydrogen, produced twice as much porosity as BT-15. With increasing rate of welding speed the amount of porosity first increased, reaching a maximum of 65 to 85 pores per 100 mm length at 12 m/hr, and then dropped sharply, to approximately 4 to 14 pores

Card 1/2

AID Nr. 990-1 14 June

POROSITY IN Ti-ALLOY WELDS [Cont'd] S/135/63/000/004/007/012

per 100 mm as the rate increased to 25 m/hr. With increasing specific heat input the amount of porosity increases sharply, especially in welds on pickled sheets. With BT-15 sheets cleaned with a wire brush an increase of heat input from 200 to 300 cal/cm increased porosity from ~ 5 to ~ 25 pores per 100 cm, while with sheets degreased, pickled, and wire brushed the same increase in heat input increased porosity from 30 to well over 80 pores per 100 mm. [DV]

Card 2/2

GORSHKOV, A.I. (Moskva); TRET'YAKOV, F.Ye. (Moskva)

Effect of hydrogen and addition elements on the porosity formation in titanium weldments. Avtom. svar. 16 no.9:36-41 S '63. (MIRA 16:10)

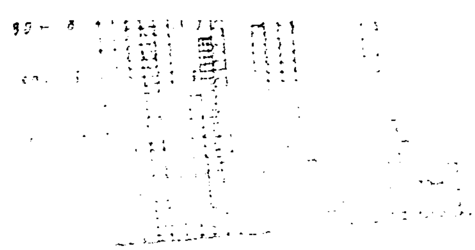
TRET'YAKOV, Fedor Yemel'yanovich; GOLOVKIN, Rostislav Vladimirovich; GOL'BERG, Viktor Yakovlevich

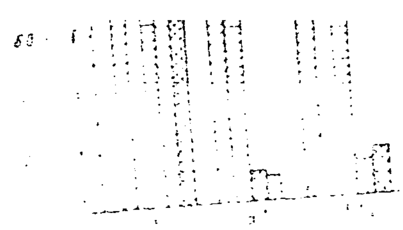
[Making welded pipes of titanium and its alloys] Proizvodstvo svarnykh trub iz titana i ego splavov. Moskva, Izd-vo "Metallurgiia," 1964. 53 p. (MIRA 17:6)

TRET'YAKOV, F.Ye.; KIRYUKHINA, G.N.; GORSHKOV, A.I.

Effect of heat treatment on the structure and properties of VT15 alloy welds. Metalloved. i term. obr. met. no.5:59-63 My '65. (MIRA 18:7)

TITLE: [illegible] of heat treatment on [illegible]
made [illegible]





TRET'YAKOV, F.Ye., kand.tekhn.nauk; GORSHKOV, A.I., inzh.

Effect of pores on the structural strength of welded titanium pipe joints. Svar.proizv. no.10:31-33 O '64. (MIRA 18:1) titanium tubes

SOURCE: Svarochnoye proizvodstvo, no. 10, 1964, 31-33

[illegible] tube, titanium alloy tube.

[illegible]

ABSTRACT: Weld porosity is the main defect encountered in longitudi- [illegible]

Card 1/2

0 to 100 pores per 100 mm of the weld length. The results of the tests showed that isolated pores, with diameters not exceeding 40% of the wall thickness, have no effect on the ... strength.

ASSOCIATION: none

SUBMITTED:

NO REF SOV:

ATD PRESS: 3133

Card 2/2

18(5) SOV/135-59-8-2/24

AUTHORS: Tret'yakov, F.Ye., Candidate of Technical Sciences, Rogozhkina, I.K., Technician, Konstantinov, V.I., Candidate of Technical Sciences, and Polyakov, Ya. M., Engineer

TITLE: Argon Shielded Arc Welding of Tantalum

PERIODICAL: Svarochnoye proizvodstvo, 1959, Nr 8, pp 5-7 (USSR)

ABSTRACT: The acceleration in the development in the chemical industry, which was urged by the plenary session of the Central Committee of the Communist Party of the Soviet Union in May 1958, depends to a considerable degree on the use of new, highly effective alloys and metals. Especially important in this connection is tantalum, which is very refractory and extremely resistant to corrosion, mainly in regard to acids. In the following part of the article the main physical and mechanical qualities of tantalum are compared with those of titanium, aluminum, and iron (Tables 1 and 2). In spite of its relatively low strength tantalum is used in a number of industrial branches.

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Argon Shielded Arc Welding of Tantalum SOV/135-59-8-2/24

Especially in the chemical industry it is used because of its high resistance to corrosion. In the following part the authors speak about the use of tantalum in the USA and about the different ways the metal is used. The wide application of tantalum made it necessary to work out methods for welding this metal. The foreign literature discusses some aspects of arc welding of tantalum. There are, however, no data given about the technology employed in producing the welds, and the welding equipment is not described. In Soviet literature, there are no publications about argon-shielded arc-welding of tantalum. Therefore, the authors give some data for the welding of Soviet tantalum. Tantalum plates (lamellas) of 75x150 mm with a thickness of 1.0, 1.5, 2.0 and 2.5 mm were used for the experiments. Before the welding the plates were ungreased. Argon was used to shield the arc and the welding. The electrodes were made of wolfram. In setting up the working data for the welding, the directions given in the literature and the experiences aquired in welding titanium, which is similar to tan-

Card 2/5

talum, were utilized. The welding current, the arc voltage, and the diameter of the wolfram electrode were determined by the strength of the welding samples. The shielding of the front and back side of the seam was attained by using burners, welding heads and fixtures, which are usually taken in welding titanium. The working data of the welding are given in table 3. The quality of the welded joints was controlled by surface tests and X-ray photography, which was used for a strength up to 2.0 mm. If the plates were thicker than 2 mm, they were radiographed with gamma-rays of the radioactive material thulium 170. The best results were obtained with argon which contained 0.01% of nitrogen and carbon. The mechanical qualities of the weldings were determined on standardized samples. Breaking and bending tests were carried out and the corrosive qualities of the welds determined. The tests showed, that the durability and the bending angle of the weld were equal to the durability and the bending angle of the basic metal in non-chilled condition. The plasticity of the welds was tested by hammering on the welding seams. The metallographic inspection of the welded joints and of the adjacent zones showed that a coarse crystalline structure is formed in the seam. The size of the grain decreases with the distance from the joint. At a distance of 3-5 mm from the seam the metal is finely granulated. The resistance to corrosion of the basic material and of the tantalum welds was determined with samples which were put into tightly soldered glas ampoules filled with nitric acid of 32% and sulphuric acid of 20% concentration. The results of the corrosion tests showed that the welds resisted corrosion in this solution. The corrosion in the welds did not exceed that of the whole sample, and the mechanical qualities practically do not change at all. The investigation permits the following conclusions: it is well possible to weld tantalum with an unmeltable electrode of argon within direct current and with negative poling of the electrode. Welding with tantalum it is necessary to shield the weld from influences of the atmosphere on front and back side. The

Argon Shielded Arc Welding of Tantalum SOV/135-59-8-2/24

outside is shielded by pure argon of 99.98% concentration, which comes out of the welding head. The backside of the welded joint is shielded by admitting argon over a grooved shim. There are 6 tables, 4 photographs and 6 references, 3 of which are Soviet and 3 English.

Card 5/5

18(5) SOV/135-59-7-15/15

AUTHORS: Tret'yakov, F. Ye., Candidate of Technical Sciences
Tsarkov, G.P., Technician

TITLE: Spot and Seam Resistance Welding of Titanium Alloy OT-4

PERIODICAL: Svarochnoye proizvodstvo, 1959, Nr 7, pp 47-48 (USSR)

ABSTRACT: Spot and seam resistance welding of titanium alloys, OT-4 and others, is considerably simpler than fusion welding, since with resistance welding the molten metal of the spot core must not be protected from the harmful influence of atmospheric gases (nitrogen and oxygen). The authors present data on the resistance welding technology for titanium alloy OT-4, compiled in table 1 and 2. For establishing these data they studied the surface preparation of parts to be welded, the electrode material, the electrode pressure, the magnitude of the welding current and the welding time. These data were compiled for titanium alloy

Card 1/4

SOV/135-59-7-15/15

Spot and Seam Resistance Welding of Titanium Alloy OT-4

(OT-4) sheets of 0.6 - 3.0 mm thickness. Although titanium alloy sheets are supplied in pickled condition, additional surface treatment may be necessary for removing oxide layers formed during the manufacturing process. The authors recommend using a pickling solution consisting of 350 milliliter/liter HCl, 55-60 milliliter/liter HCl, 55-60 milliliter/liter HNO_3 and 50 gram/liter NaF. After pickling the contact resistance of the titanium alloy should be 300-700 microohms. The normal reduction of the thickness of the metal amounts to 0.05-0.08 mm. Since the contact resistance of titanium alloys does not change under atmospheric conditions and normal temperatures, there is no time limit between pickling and welding. Experiments and practical experience with the application of cadmium-copper electrodes, or such made of alloy MTs-4, produced positive results. The welding conditions were established on single-phase alter-

Card 2/4

SOV/135-59-7-15-15

Spot and Seam Resistance Welding of Titanium Alloy OT-4

nating current welding machines which are more suitable for welding titanium and its alloys in the thicknesses investigated (0.6-3.0mm). The quality of the welded spots and seams was investigated by metallographic and mechanical tests. Resistance spot-welding was performed on welding machines MTP-75 and MTP-200, equipped with interrupters PIT-50 and PIT-100, as well as current stabilizers of type RAST-4A. Seam welding was tested on welding machines MShP-150 and MShPR-300 with interrupter PISh-100 and current stabilizers. The influence of the electrode pressure in spot-welding was studied on a MTP-200 welding machine. The static strength of welded spots raised with an increase of the welding current. With identical welding currents the strength of spots in parts of OT-4 titanium alloys of a thickness of 1.5 + 1.5 mm is considerably higher than of parts 1.7 + 1.7 made of titanium alloy VT-1D as shown in a graph in Fig. 2. The data for the VT-1D alloy were obtained by B.D. Orlov and P.I. Chaloshnikov

Card 3/4

SOV/135-59-7-15/15

Spot and Seam Resistance Welding of Titanium Alloy OT-4

The authors arrive at the conclusion that spot and seam welds may be easily performed on OT-4 titanium alloys using single-phase alternating current, whereby the contact resistance after pickling must not exceed 700 microohms. There are 3 graphs and 2 tables.

Card 4/4

ZABURDIN, M.K., inzh.; ZAKHARENKO, V.F., inzh.; SHESTAKOV, S.N., inzh.; TRET'YAKOV, F.Ye., kand.tekhn.nauk

Butt welding of titanium and its alloys using modernized type MSGA-300 machines. Svar. proizv. no.9:36-39 S '58. (MIRA 11:9)
(Titanium--Welding) (Electric welding--Equipment and supplies)

TRET'YAKOV, F.Ye., kand. tekhn. nauk; KAIHOVA, G.Ye., inzh.

Strength of various types of BT1 titanium joints carried out by resistance welding. Svar. proizv. no. 7:19-23 '58. (MIRA 11:7)
(Titanium--Welding)
(Electric welding)

L 14565-66 EWT(m)/EWA(d)/EWP(v)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b) IJP(c) MJW/JD/HM

ACC NR: AP6003284 SOURCE CODE: UR/0135/66/000/001/0024/0026

43

B

AUTHOR: Gorshkov, A. I. (Candidate of technical sciences); Tret'yakov, F. Ye. (Candidate of technical sciences)

ORG: none

6,44,55

TITLE: Short-arc welding of VT6S titanium alloy

SOURCE: Svarochnoye proizvodstvo, no. 1, 1966, 24-26

TOPIC TAGS: welding, arc welding, short arc welding, titanium, titanium alloy, alloy welding, TIG welding / VT6S titanium

ABSTRACT: Short-arc TIG welding of VT6S titanium alloy has been studied. It was found that by gradual lowering of the tungsten electrode end below the part level (Fig. 1), titanium-alloy parts up to

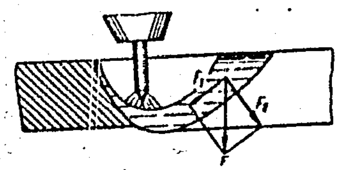

Fig. 1. Layout of short-arc TIG welding

UDC: 621.791.856.3:669.295.5

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L 14565-66

ACC NR: AP6003284

0

10 mm thick can be welded without filler or special equipment and without edge preparation. This method of welding increases the arc efficiency and produces welds with a thickness-to-width ratio of 0.6—0.65 compared to 0.33—0.40 in conventional TIG welding. The arc voltage is 9—10 v. Welding can be done with argon or helium shielding; the latter produces a deeper penetration. The strength and ductility of VT6S titanium welds are almost equal to those of the base metal. The heat treatment (annealing and aging) had almost no effect on the weld properties. Weld metal has a coarse α-phase structure. Grain growth was observed in the weld-adjacent zone. Orig. art. has: 6 figures and 3 tables. [ND]

SUB CODE: 11, 13/ SUBM DATE: none/ ORIG REF: 002/ ATD PRESS: 4190

GO

Card 2/2

TRET'YAKOV, G.; US, V.; TOROS, Kh.; VLADIMIROV, K.

Reliable protection. Pozh.delo 3 no.8:8-9 Ag '57. (MLRA 10:8)

1. Nachal'nik Medvedovskoy mezhkolkhoznoy dobrovol'noy pozharnoy druzhiny (for Tret'yakov).
2. Komandir otdeleniya Dobrovol'noy pozharnoy druzhiny kolkhoza imeni Lenina, Novo-Titarovskogo rayona (for Us).
3. Nachal'nik Dobrovol'noy pozharnoy druzhiny kolkhoza imeni Lenina, Gelendzhikskogo rayona (for Toros).
4. Predsedatel' kolkhoza imeni Kirova, Plastunovskogo rayona (for Vladimirov).

(Kuban--Fire prevention)

TRET'YAKOV, G., Maj. Gen. Eng-Tech. Service

"Development of Artillery Materiel," from the book Modern Military Technology, 1956, page 59.

Translation 1114585

TRET'YAKOV,G.

Assure complete coal haulage for the winter of 1947-48. Zhel.dor. transp. no.12:9-15 D'47. (MLRA 8:12)

1. Direktor-polkovnik dvizheniya
(Railroads--Freight) (Coal--Transportation)

TRET'IAKOV, G.

Novaia magistral' Novosibirsk-Leninsk. [The new truck line Novosibirsk-Leninsk]. (Transportnoe stroitel'stvo, 1934, no. 2, p. 7-9).
DLC: HE7,T7

SO: Soviet Transportation and Communications, A Bibliography, Library of Congress, Reference Department, Washington, 1952, Unclassified.

APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R001756530007-7"

TRET'IAKOV, G. I.

Voprosy novogo zheleznodorozhnogo stroitel'stva v 1934 godu. [The problems of railroad construction in1934]. (Sots. transport, 1933, no. 11-12, p. 12-24).
DLC: HE7.S6

SO: Soviet Transportation and Communications, A Bibliography, Library of Congress, Reference Department, Washington, 1952, Unclassified.

TRET'YAKNOV, G. I.

Novoe zheleznodorozhnoe stroitel'stvo v 1934 g. [The new railroad construction in 1934].
(Transportnoe stroitel'stvo, 1933, no. 11, p. 3-5).
Gives a list of projected railroad lines which are to be completed in 1934.
DLC: HE7.T3

SO: Soviet Transportation and Communication, A Bibliography, Library of Congress, Reference Department, Washington,, 1952, Unclassified.

TRET'YAKOV, G.N.; KOKOSHKO, Z.Yu.

Chloromethylation of anisole derivatives. Trudy Ural.politekh. inst. no.96:37-41 '60. (MIRA 14:3)
(Anisole)

TRET'YAKOV, G.N.

I have devoted thirty-five years to my beloved work. Energetik 10 no.2:30-31 F '62. (MIRA 15:2)
(Shcherbakov, Ivan Alekseevich)

STEPANOV, Vasiliy Titovich. Prinimal uchastiye TYUKINA, N.N., zootekhnik. TRET'YAKOV, G.P., red.; SEMENCHUK, S.I., red.; YASHEN'KINA, Ye.A., tekhn.red.

[Ways of increasing productivity in sheep raising] Put' povysheniia produktivnosti ovtsevodstva. Kuibyshev, Kuibyshevskoe knizhnoe izd-vo, 1960. 12 p. (MIRA 14:2)

1. Chaban kolkhoza "Put' Il'icha," Alekseyevskogo rayona (for Stepanov).

(Sheep)

APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R001756530007-7"

BOLDYREVA, Klavdiya Vasil'yevna, svinarka. Prinimal uchastiye LUK'YANOV, N.V., zootekhnik. TRET'YAKOV, G.P., red.; SEMENCHUK, S.I., red.; YASHEN'KINA, Ye.A., tekhn.red.

[Lowering the cost of pork production] Snizhaem zatraty na proizvodstvo svininy. Kuibyshev, Kuibyshevskoe knizhnoe izd-vo, 1960. 11 p. (MIRA 14:1)

1. Sovkhoz "Pioner" (for Boldyreva).
(Swine)

IVANNIKOV, V.F., nauchnyy sotr.; PAKHOMOV, A.Ya., nauchnyy sotr.; UCHAYKIN, V.D., nauchnyy sotr.; FOMIN, I.P., nauchnyy sotr.; TIMOFEYEV, D.T., nauchnyy sotr.; TRET'YAKOV, G.P., red.; SEMENCHUK, S.I., red.; YASHCHEN'KINA, Ye.A., tekhn. red.

[Improve cultivation practices and increase sugar beet yields] Sovershenstvovat' agrotekhniku, povyshat' urozhai sakharnoi svekly. Kuibyshev, Kuibyshevskoe knizhnoe izd-vo, 1960. 52 p. (MIRA 14:10)

1. Kinel'skaya selektsionnaya stantsiya Kuybyshevskogo sel'skokhozyaystvennogo instituta (for Ivannikov, Pakhomov, Uchaykin, Fomin, Timofeyev)

(Sugar beets)

TRET'YAKOV, G.P.

Blood serum protein fractions in eczema and neurodermatitis. Vest. derm. i ven. 37 no.5:16-20 My '63. (MIRA 17:5)

1. Kafedra kozhnykh bolezney (zav. - doktor med. nauk L.A. Shteynlukht) Leningradskogo pediatricheskogo meditsinskogo instituta.

DRAPATSKIY, M.Ya.; TRET'YAKOV, G.S.; KOSOVA, K.D., red.

[Seiner "Chuguev"] Seiner "Chuguev." Moskva, Izd-vo "Pishchevaia promyshlennost'," 1964. 23 (MIRA 17:6)

TRET'YAKOV, I.

Research carried out by the Laboratory of Channel Regulation.
Rech. transp. 23 no.10:40-42 O '64. (MIRA 17:12)

1. Nachal'nik laboratorii Upravleniya kanala imeni Moskvy.

PROKOP'YEV, B.V.; TRET'YAKOV, I.A.

Carbonate equilibrium in the Arshan mineral waters (Arshan Health Resort, Buryat-Mongol A.S.S.R.). Gidrokhim. mat. 31:164-170 '61. (MIRA 14:3)

1. Kafedra analiticheskoy khimii Irkutskogo gosudarstvennogo universiteta im. A. A. Zhdanova, g. Irkutsk.
(Arshan—Mineral waters) (Carbonates)

MESTYAKOV, A.D., kand. tekhn. nauk; ZHEREBCHEVSKIY, L.Sh., inzh.; KOGAN, A.F., inzh.

Operation of the SM-847 vibration rolling segment mill. Trudy NIIZHB no.33:241-247 '64. (MIRA 18:2)

BAKLANOV, N.A.; UDYMA, P.G., inzh., retsenzent; TRET'YAKOV, I.F., inzh., red.; RYZHOVA, L.P., inzh., red. izd-va; SOKOLOVA, T.F., tekhn. red.

[Transportation of liquids in chemical industries] Transportirovka zhidkostei v khimicheskikh proizvodstvakh. Moskva, Mashgiz, 1962. 166 p. (MIRA 16:5)

(Liquids--Transportation)
(Chemical industries--Equipment and supplies)

RAMODANOV, B.I.; TRET'YAKOV, I.G.

Use of deep boreholes in upraising in a potassium mine. (MIRA 15:9)
Khim.prom. no.9:613-614 Ag '62.
(Potassium)
(Mining engineering)

TRET'YAKOV, I. I.

USSR/Chemistry - Catalysis
Chemistry - Electron Microscope

Jan 49

"Study of the Surface of Working Contacts by Electron Microscope: I. Applying the Method of Shaded Replicas to the Study of Variations in Contacts Under the Influence of a Catalyzable Reaction," S. Z. Roginskiy, I. I. Tret'yakov, A. B. Shekhter, Inst of Physicochem, Acad Sci USSR, Moscow, 7 pp

"Zhur Fiz Khim" Vol XXIII, No 1 - pp. 10-6

Analyzes possible mechanisms of changes of surface of catalyzer during the heterogeneous catalysis. Studies of such changes enable clarification of working mechanism of catalyzer and structure of active surface. Method of "shaded replicas" is used to study these changes. Abrupt change is noticed in structure of palladic catalyzer during formation of water from detonating gas. Gives 13 microscopic photos of surface changes, table on ridges and depressions of surface, and diagram of a device for hydrogen oxidation. Submitted 18 May 48.

PA 48/49T15

PROCESSES AND PROPERTIES INDEX

2C

B

Electron-Microscopic Investigation of Surfaces of Active Contact Catalysts. II. Changes of the Surface of Massive Palladium During Contact-Catalytic Oxidation of Hydrogen. (In Russian.) S. Z. Roginskii, I. I. Tret'yakov, and A. B. Shekhter. *Zhurnal Fizicheskoi Khimii* (Journal of Physical Chemistry), v. 23, Oct. 1949, p. 1152-1160.

Above investigation revealed that the surface of the palladium undergoes marked structural changes, accomplished by means of surface slip of metallic atoms. Character and successive stages of these changes were established. Also, it was found that activation of the surface by oxygen and deactivation by hydrogen does not result in these changes. 11 ref.

METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

16

B

COMMON ELEMENTS

COMMON VARIABLES INDEX

Method of Production of Replicas of Definite Submicroscopic Areas of Solid Surfaces. (In Russian.) I. I. Tretyakov, and A. B. Shekhter. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 66, May 11, 1949, p. 231-233.

Thoroughly describes method for the above, particularly important in electron microscopy. Illustrated.

E-2

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

MATERIALS INDEX

AUTHOR INDEX

TRET'YAKOV I. I.,

USSR/Chemistry - Catalysts

21 Oct 49

"Role of Surface Mobility of Metal Atoms in the Process of Preparing Supported Catalysts," A.B. Shekhter, A. I. Yecheistova, I. I. Tret'yakov

"Dok Ak Nauk SSSR" Vol LXVIII, No7, pp 1069-1072

Electron-microscope studies of silver, gold, and palladium du ted on various supports (asbestos, zinc oride, carbon black) showed that change of structure which occurs when these prepn are heated is caused by surface mobilit , which is intensified when temp is increased. Cites certain regularities observed in this "creep" process of metal atoms. Submitted by Acad A. N. F umkikin 16 Aug 49.

PA 172T7

C 37

2

The "zonal" character of the changes in a palladium catalyst in the course of the oxidation of hydrogen. A. B. Shekhter and I. I. Tret'yakov. *Doklady Akad. Nauk S.S.S.R.* 72, 551-4(1950).—A polished Pd plate placed in a stream of undild. $2H_2 + O_2$ attains high catalytic activity much faster than an unpolished plate, and its temp. (measured with the aid of a thermocouple soldered to the plate) attains 700° at a furnace temp. of 160°. On diln. of the gas mixt. with 40% N_2, the temp. of the plate does not exceed 450° and the plate shows distinct structural changes after 3 hrs.' service. With 70% N_2, the temp. does not rise beyond 350° and no structural changes are noticeable even after 20 hrs. Heating of the Pd to 500-600° either *in vacuo* or in H_2, O_2, or H_2O alone caused no structural changes; these, consequently, are due to actual operation as catalyst. Electron-microscopic examn. of a Pd plate operated as catalyst in a gas mixt. dild. with 40% N_2 revealed far-reaching heterogeneity of the surface; examn. of submicroscopic areas of about 50 sq. μ each showed changes of aspect with the length of time of catalytic operation. The distribution of the various types of structural changes was revealed by an ordinary microscope under a magnification of ~250. Photomicrographs show "zones" of ~0.05 mm. in diam., sharply distinct from each other and with polygonal orientations. The boundaries of the zones remain unchanged with the time of operation, but within each zone the structure changes gradually in the direction of increasing cryst. character. The similarity of the boundaries of the "zones" with the grain boundaries revealed by etching suggests their identity. It follows that, during the catalysis, each given crystal face undergoes a distinct type of structural change. A similar "zonal" picture is obtained with massive Pt catalysts. N. Thon

TRET'YAKOV, I.I.

Jan/Feb 51

USSR/Chemistery - Catalysts

"Structure of Fine Metallic Films Deposited on Asbestos and Gas Carbon Black," A. B. Shekhter, A. I. Yecheistova, I. I. Tret'yakov, Inst Phys Chem, Acad Sci USSR

"Iz Ak Nauk SSSR, Otdel Khim Nauk" No 1, pp 42-46

Studies electronic-microscopic structure of fine films of Ag and Au deposited under vacuum on asbestos and thermal carbon black. Shows role of surface mobility of metal atoms on prepn of catalysts and of nature of carrier on dispersion and form of catalyst particles. Surface mobility of atoms must be introduced as criterion detg suitability of catalyst.
LC

PA 174T8

TRETYAKOV, I. I.

USSR

Electron-microscopic study of the surface changes of massive catalysts at work. A. B. Shekhter and I. I. Tret'yakov. *Bull. Acad. Sci. U.S.S.R., Div. Chem. Sci.* 1953, 397-402(Engl. translation).—See C.A. 48, 13382b.

H. L. H.

TRET'YAKOV, I. I.

Journal of Applied Chemistry
June 1954
Industrial Inorganic Chemistry

Electron microscopical study of changes in the surface of massive catalysts during use. A. B. Shekhter and I. I. Tret'yakov (*Izvestia*, 1953, No. 3, 442—447).—Electron micrographs (×16,000) of the surfaces of polished Pt, Pd, Cu, Fe, and Pt/Rh alloys catalysing the $H_2 + \frac{1}{2}O_2$ reaction (N_2 as diluent) show them to undergo continuous and complicated changes and indicate qualitative differences in the behaviour of faces of crystals projecting from the surface. There is no simple relation between the catalytic activity and degree of development during catalysis of the different faces of Cu mono-crystals.

R. C. MURRAY.

Inst. Phys. Chem., AS USSR

TRET'YAKOV, I. I.

21 Aug 53

USSR/Chemistry - Catalysts, Platinum

"The Nature of the Activation of Platinum With a Hydrogen-Oxygen Explosive Mixture," O. V. Krylov, S. Z. Roginskiy, I. I. Tret'yakov, Corr Mem Acad Sci USSR

DAN SSSR, Vol 19, No 6, pp 1353-1355

Data obtained by electron-microscopic and electrono-graphic investigation of Pt surfaces indicate when collated with kinetic data that increasing porosity of the surface, occurring as a result of the reaction, has little influence on the activity of the Pt catalyst. The same applied to the formation of Pt_3O_4, which may even reduce the activity when the quantity of O_2 is large. Activation of Pt during the reaction takes place as a result of absorption of O_2 by the metal.

269T12

Tret'yakov, I. I.

Changes in metallic surfaces produced by chemical processes and by heating. S. Z. Roginskii, I. I. Tret'yakov, and A. B. Shekhter. *Doklady Akad. Nauk S.S.S.R.* 91, 1167-9(1953).—Structures similar to those produced by thermal etching were produced at much lower temps. by reactions catalyzed by the metal being studied. Pt that had been used to catalyze the reaction $H_2 + O_2$ for 24 hrs. at 600° was observed with the electron microscope to have a "stepped-terrace" structure with terraces about 1 μ wide. Terraces only about 500 A. wide were observed on Pd heated in vacuum at 1000°. A lamellar structure with a spacing of 200 to 300 A. was observed on Pt (treatment not described). The observed structures were not caused by local overheating, since a "crater" structure was observed with rapid rates of reaction. At rates that led to the usual terraces, the initial structure was rounded "hills and valleys" of about the same dimensions. The thermodynamic free energy is minimized by structural changes involving the elimination of worked surface metal, the replacement of crystal faces of high energy by those of lower energy, and the coarsening of grains by recrystn. Specific chem. adsorption can lower the surface energy so that the equil. structure may be different in the presence and in the absence of a given substance. Chem. impurities may form an interfering film at cryst. boundaries. A. G. Guy

CH

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TRET'YAKOV, I.I.

Chem Abs V48
1-25-54
General & Physical Chemistry

The nature of activation of palladium by oxygen-hydrogen mixtures. O. V. Krylov, S. Z. Roginskii, and I. I. Tret'yakov. *Doklady Akad. Nauk S.S.S.R.* 92, 75-6(1953); cf. *ibid.* 91, 1353(1953); *C.A.* 47, 5232g.—The previously noted phenomena on the action of H_2 and O_2 on Pt surfaces also occur on surfaces of Pd. The metal is activated by O_2-H_2 mixts. as a result of deep-seated alteration of the surface, with the captured O_2 apparently acting as a surface-modifying admixt. The optimum amt. of O_2 in respect to catalytic activation of Pd appears to be that corresponding to the formation of a monolayer, i.e., an admixt. of a very small percentage of the total compn. On this activation is superimposed the effect of increased activity connected with the increase of the abs. surface due to loosening of the surface of the metal. The phenomenon appears to be general for the noble metals. Electron-microscopic photographs of typical surfaces are shown. G. M. Kosolapoff

TRET'YAKOV, I.I.

Met 3

B. T. R.
V. 3 No. 3
Mar. 1954
Corrosion

3133* **Catalytic Corrosion.** (Russian.) S. Z. Roginskii, I. I. Tret'iakov, and A. B. Shekhter. *Doklady Akademii Nauk SSSR*, v. 91, no. 4, Aug. 1, 1953, p. 881-884 + 1 plate.
Discusses external effect of catalytic and sorption corrosion on surface structure. Table, micrographs. 7 ref.

[illegible]T'YA[illegible]OV, I. I.

"Electron Microscopic Investigation of Variations in Large Metallic Catalysts During Operation." Cand Chem Sci, Inst of Physical Chemistry, Acad Sci USSR, Apr-June 54. (Vest Ak Nauk SSSR, Sep 54)

SO: Sum 432, 29 Mar 55

TRET'YAKOV, I.I.

LATIMER, Wendell Mitchell; LOSEV, V.V., translator; TRET'YAKOV, I.I., translator; ASTAKHOV, K.V., professor, redaktor; OGANDZHANOVA, N.A., redaktor; SHAPOVALOV, V.I., tekhnicheskiy redaktor

[The oxidation states of the elements and their potentials in aqueous solutions. Translation from the English] Okislitel'nye sostoianiia elementov i ikh potentsialy v vodnykh rastvorakh. Perevod s angliiskogo V.V.Loseva, I.I.Tret'iakova. Pod red. K.V.Astakhova. Moskva, Izd-vo inostrannoi lit-ry, 1954. 400 p. (MLRA 8:3)
(Electrolysis) (Oxidation) (Chemical elements)

Tret'yakov, I. I.

Electron-microscopic study of nickel catalysts for fat hydrogenation. S. Yu. Elovich and I. I. Tret'yakov. *Kataliticheskoe Gidrirovanie i Okislenie, Akad. Nauk Kazakh. S.S.R., Trudy Konf.* 1955, 218-32.—Used fat hydrogenation catalyst samples were examd. electron microscopically and illustrated. The Ni-Cu catalyst, suspended and dispersed in the fat, is washed with $(CH_2Cl)_2$ and suspended in AmOAc contg. a little collodion; a drop of the suspension is placed on H_2O and the resulting collodion film contg. the dispersed catalyst is mounted for the examn. The most common particle size in this catalyst is about 1μ, with the metal coating the diatomite carrier like a sheath; distribution curves of particle size are presented, and no substantial difference is found between 2 specimens which had been used 4 hrs. and 6.5 hrs., resp. Isotherms for C_4H_4 at −78° were detd. for typical samples; these have an S-shape indicating a porous structure of the catalysts. The specimen carried on diatomite showed a much larger available active surface than one without a carrier support (10 sq. m. per g. against 2).

G. M. Kosolapoff

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TRET'YAKOV, I.I.

USSR/ Chemistry - Physical chemistry

Card 1/1 Pub. 147 - 20/21

Authors : Roginskiy, S. Z.; Tret'yakov, I. I.,; and Shekhner, A. B.

Title : Discussion on catalytic corrosion

Periodical : Zhur. fiz. khim. 29/10, 1921-1923, Oct 1955

Abstract : In connection with a report by G. Carton and J. Turkevich in the "Journ de chim. phys." 1954, the authors conducted a lengthy discussion and quoted numerous experimental data on catalytic corrosion. Twenty references: 16 USSR, 2 USA, 1 French and 1 Germ. (1934-1954). Illustrations.

Institution : Acad. of Sc., USSR, Inst. of Phys. Chem., Moscow

Submitted : May 16, 1955

TRETYAKOV, I.I.

USSR/ Chemistry - Catalysis

Card 1/1 Pub. 22 - 23/54

Authors : Roginskiy, S. Z. Memb. Corresp. of Acad. of Sc. USSR,; Tretyakov, I. I.; and Shekhter, A. B. [redacted]

Title : Catalysis over monocrystals

Periodical : Dok. AN SSSR 100/3, 487-490, Jan 21, 1955

Abstract : The oxidation of hydrogen, methanol and the decomposition of isopropyl alcohol and methanol were investigated to compare the activity of Cu-crystal facets of various indices. The conversion percentage in all investigated cases was found to be insignificant. According to electron microscopic observations the catalytic corrosion was very low and has no effect on the catalytic activity of the monocrystals. The results obtained for various reactions are tabulated. Seven references: 5 USA and 2 USSR (1947-1953). Table, drawing.

Institution : Academy of Sciences USSR, Institute of Physical Chemistry

Submitted : August 7, 1954

TRET'YAKOV, I.I.

USSR/Physical Chemistry - Crystals, B-5

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 60882

Author: Roginskiy, S. Z., Tret'yakov, I. I.

Institution: None

Title: On Some Phenomena Observed at the Surface of a Tungsten Monocrystal in an Electron Microscope-Projector in the Presence of Gases

Original Periodical: Dokl. AN SSSR, 1955, 105, No 1, 112-114

Abstract: Studied were the effects of O_2, H_2 and He, introduced into the flask of an electron microscope-projector, on the images of [redacted] W-points. The points were purified by heating to 2,500° K at pressure 10^{-10} mm kg. O_2 and H_2 were introduced into apparatus by breaking sealed capillaries filled with these gases. To a pressure of 5.10^{-8} mm kg there was observed decreased intensity of emission of electrons. At higher pressures (up to 5.10^{-6}) on the screen appeared circular light spots the time of persistence [redacted]

Card 1/2

USSR/Physical Chemistry - Crystals, B-5

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 60882

Abstract: of which varied from 0.1 to several times 10 seconds. The assumption is made that occurrence of these spots is connected with adsorption of individual molecules of the gas. [illegible] introduced into the system through heated glass wall [illegible] not produce this effect.

Card 2/2

USSR/Fitting Out of Laboratories - Instruments, Their Theory, Construction, and Use, H

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61983

Author: Tret'yakov, I. I.

Institution: None

Title: Seal for Superhigh Vacuum

Original Periodical: Zavod. laboratoriya, 1956, 22, No 3, 362

Abstract: The seal permits prolonged maintaining within evacuated system a vacuum of the order of 10^{-10} mm Hg. Casing of the seal is made of molybdenum glass and has 2 outlets for connection to diffusion pump and system being evacuated. Closure of seal is effected on lifting by external magnet of dish with fused fin until tube leading to evacuated system becomes immersed therein. The dish can be locked in uppermost position by means of second magnet until the tin solidifies. Fusion of tin is effected by heating coil wound on seal casing.

Card 1/1

TRET'YAKOV, I.I., kandidat khimicheskikh nauk; SADILENKO, K.M., nauchnyy sotrudnik.

Electron-ion projector. Nauka i zhizn' 23 no.2:45 F '56. (MLRA 9:5)

1. Institut nefti Akademii nauk SSSR. (Electron microscope)

4/81-PM/

VESTNIK AKAD[illegible]

Journal of the Academy of [illegible]
Vol 26, No. 3, March, [illegible]

[illegible] meeting [illegible]

[illegible]

PM/

TRET'YAKOV, I. I.

ROGINSKIY, S.Z.; TRET'YAKOV, I.I.

Study of the adsorption of simple gases on metallic monocrystals with the aid of a field emission microscope. Zhur. fiz. khim. 30 no.11:2539-2546 N '56. (MLRA 10:4)

1. Akademiya nauk SSSR, Institut fizicheskoy khimii, Moskva.
(Adsorption) (Electron microscopy)

Tret'yakov, I. I.

USSR/Physical Chemistry - Surface Phenomena. Adsorption. Chromatography. Ion Exchange, B-13

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 562

Author: Tret'yakov, I. I., and Roginskiy, S. Z.

Institution: Academy of Sciences USSR

Title: On the True Nature of the Patterns of Individual Oxygen Molecules Described in the Work of Becker and Brandeis

Original Periodical: Dokl. AN SSSR, 1956, Vol 107, No 6, 857-858

Abstract: It is shown that the double, quadruple, and more complex spots appearing on the screen of the electron microscope with a single-crystal tungsten point (Referat Zhur - Khimiya, 1956, 22130) are caused not by adsorbed oxygen or any other diatomic gas present in the system, but are apparently due to impurities which separate from the glass walls of the instrument.

Card 1/1

TRET'YAKOV, I.I.

Stand for electronic projector. Trudy Inst. fiz. khim. no.6: 181-188 '57. (MIRA 11:10)
(Cathode ray tubes) (Electron microscopy)

TRET'YAKOV, I.I., kandidat khimicheskikh nauk.

Using electron and ion projection microscopes for studying the adsorption of gases on metals. Khim. nauka i prom. 2 no.2:181-189 '57. (MIRA 10:6)
(Adsorption) (Microscope) (Metals)

TRET'YAKOV, I.I.

Study of gas adsorption on metals by means of a field emission microscope. Probl. kin. i kat. 10:164-168 '60. (MIRA 14:5)

1. Institut fizicheskoy khimii AN SSSR.
(Adsorption) (Electron microscopy)

BALOVNEV, Yu.A.; ROGINSKIY, S.Z.; TRET'YAKOV, I.I.

Nature of the catalytic activity of platinum in the oxidation of hydrogen. Dokl. AN SSSR 158 no.4:929-931 O '64. (MIRA 17:11)

1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen-korrespondent AN SSSR (for Roginskiy).

BALOVNEV, Yu,A.; ROGINSKIY, S.Z.; TRET'YAKOV, I.I.

Kinetics of hydrogen oxidation oxidation on clean platinum surfaces. Dokl. AN SSSR 163 no.2:394-397 Jl '65. (MIRA 18:7)

1. Institut khimicheskoy fiziki AN SSSR. 2. Chlen-korrespondent AN SSSR (for Roginskiy).

KRYLOV, O.V.; MARKOVA, Z.A.; TRET'YAKOV, I.I.; FOKINA, Ye.A.

Mechanism of adsorption and isotope exchange of CO_2 on MgO and $Mg(OH)_2$. Kin. i kat. 6 no.1:128-136 Ja-F '65. (MIRA 18:6)

1. Institut khimicheskoy fiziki AN SSSR.

TRETYAKOV, I. I.; KRYLOV, O. V. ; MARKOVA, S.A.; FOKINA, Ye. A.;

" Untersuching des Mechanismus der Adsorption und des Isotopenaustausches von CO2 an MgO und Mg(OH)2."

Third Working Conference on Stable Isotopes, 28 October to 2 November 1963, Leipzig.

SOURCE CODE: UR/9037/66/000/002/0039/0048

ACC NR: AP7000419

AUTHOR: Tret'yakov, I. L.

ORG: Department of Meteorology and Climatology, Moscow State University (Kafedra meteorologii i klimatologii, Moskovskiy gosudarstvennyy universitet)

TITLE: Peculiarities of the structure of the tropopause in a jet-stream zone

SOURCE: Moscow. Universitet. Vestnik. Seriya V. Geografiya, no. 2, 1966, 39-48

TOPIC TAGS: tropopause, meteorologic observation, atmospheric temperature, ~~meteorology~~, tropospheric wind, jet stream, atmospheric turbulence, stratospheric wind/Kazakhstan

ABSTRACT: This paper presents the results of a study of the structural characteristics of the tropopause in the jet-stream zone over the eastern Pamirs for the period July—September 1957—1959. The initial data were aerological observations made in the Koshagyl Valley of the eastern Pamirs (northern part of the subtropical zone). Here, the lower boundary of the tropopause generally is 16—17-km above sea level. Preliminary study showed that in these months the troposphere is divided into an upper and a lower part, separated by an atmospheric layer between the

UDC: 551.510.5(235.211)

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APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R001756530007-7"

ACC NR: AP7000419

Table 1. Mean values characterizing retardation layers in July—September 1957—1959 over the Koshagyl Valley (E. Pamirs)

Year	Month	Height of lower boundary, km	Temperature at lower boundary, in degrees	Height of upper boundary, km	Temperature of upper boundary, in degrees	Thickness of layer, km	Mean lapse rate	No. of cases	No. of cases without retardation layer
1957	VII	8,0	—23,3	9,4	—28,1	1,4	0,20	27	1
	VIII	7,6	—19,8	9,0	—23,8	1,4	0,26	24	3
	IX	8,2	—28,2	9,4	—31,8	1,2	0,30	9	21
1958	VII	7,7	—19,1	9,4	—23,1	1,7	0,24	13	0
	VIII	8,2	—24,4	9,5	—27,4	1,3	0,23	21	1
	IX	8,0	—24,1	9,6	—28,2	1,6	0,25	10	4
1959	VII	7,6	—19,6	9,1	—23,4	1,5	0,25	20	0
	VIII	7,6	—19,5	8,6	—21,1	1,0	0,16	19	12
	IX	7,1	—15,1	8,2	—18,0	1,1	0,27	17	10
1957—1959	VII	7,8	—20,7	9,3	—24,2	1,5	0,23	60	1
	VIII	7,8	—21,2	9,0	—24,1	1,2	0,22	64	16
	IX	7,8	—22,5	9,1	—26,0	1,3	0,27	36	35

Comment. Reduced mean lapse rate of 0.16C/100 m for August 1959 is due to the fact that these were the seven cases in which retardation layers were observed, as well as polar tropopauses, instead of the retardation layer.

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ACC NR: AP7000419

400 and 300-mb surfaces (average thickness of 1.0 to 1.4 km) (see Table 1). During these observation periods, the height of the lower boundary of the air layer varied from 7.1 km (September 1959) to 8.2 km (September 1957), and the temperature fluctuated from -15.1 to -28.2C. The change in the mean monthly lapse rate from 0.16 to 0.30C/100 m was an outstanding feature. Because of the relatively high temperatures at the lower boundaries and lapse rates which did not conform to criteria adopted for defining the tropopause, the author called this zone the "retardation layer." A polar tropopause was present when the retardation layer was absent. When the lower boundary of the retardation layer rose to a height of 10—11 km, it assumed the properties of a clearly-expressed polar tropopause despite the fact that a second, even more clearly-defined, tropical tropopause was present at a height of 16—17 km. Between the polar tropopause and the tropical tropopauses there was almost always a strong jet stream along whose axis speed exceeded 100 km/hr. Since the usual presence of two jet streams over the eastern Pamirs at heights of 10—11 and 16—17 km were not identified in the aerological observations over Koshagyl, vertical profiles were constructed over a line of stations extending for a distance of about 1300 km south from Karaganda through Balkhash, Alma-Ata and Dzhalal-Abad to Koshagyl.

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ACC NR: AP7000419

Table 2. Mean height of lower boundary of the polar and tropical tropopauses, the mean temperature in them, and their frequency (profile along 70° E. long. in a line connecting Karaganda and Koshagyl in August, 1957—1959 (3-hr observation period)

Stations	Years	Tropopause					
		Polar			Tropical		
		H, km	t°	No. of cases	H, km	t°	No. of cases
Karaganda	1957	10,6	—50,3	31	—	—	0
	1958	11,3	—53,9	31	—	—	0
	1959	10,6	—51,0	31	14,2	—52,3	2
Balkhash	1957	10,8	—49,2	25	14,6	—53,3	20
	1953	11,3	—49,8	29	14,2	—51,5	8
	1959	10,7	—47,1	29	15,2	—54,8	6
Alma-Ata	1957	10,2	—40,3	25	15,6	—58,1	27
	1958	11,0	—46,2	25	15,8	—58,3	21
	1959	10,0	—40,1	29	14,8	—56,1	26
Dzhalal-Abad	1957	No observations					
	1958	10,9	—44,1	25	15,6	—60,3	30
	1959	9,9	—27,5	26	16,0	—62,6	22
Koshazyl	1957	—	—	0	16,6	—67,6	29
	1958	9,9	—42,2	6	16,4	—66,8	19
	1959	10,3	—37,8	1	16,3	—68,6	16

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ACC NR: AP7000419

Analysis of these profiles (see Table 2) confirmed the existence of two tropopauses and two jet-stream levels, which appeared most frequently over Alma-Ata and Dzhalal-Abad, but only rarely at Koshagyl where a retardation layer most frequently was observed. Because the observations were made in the subtropical zone where the tropical tropopause is very high and the temperatures are very low, the retardation layer, with its low bottom boundary (6—9 km) and high temperature (-10 to -35C), was assumed to be a polar tropopause which had undergone transformation. Such a formation probably extended as far south as the Pamir foothills in the summer. However, as it moved farther south, it underwent changes and became a retardation layer. Sometimes it disintegrated completely and was assimilated into the tropospheric subtropical air. The Pamirs acted as a barrier to further southward movement of the polar tropopause and possibly affected its transformation, as discussed below.

The tropical tropopause extended as far north as Balkhash and Karaganda, its frequency began to diminish between Alma-Ata and Balkhash, and above Karaganda it was rarely observed (greatest frequency over Karaganda in September 1959).

Figure 1 shows that the bottom of the polar tropopause had a general tendency to become lower as it moved southward (from 11.3 to 9.9 km high over a distance of 1300 km) and the temperature rose from -53.9 to

ACC NR: AP7000419

-42.2C. Throughout the observation periods only six such cases were observed; the remaining cases were marked by the presence of a retardation layer.

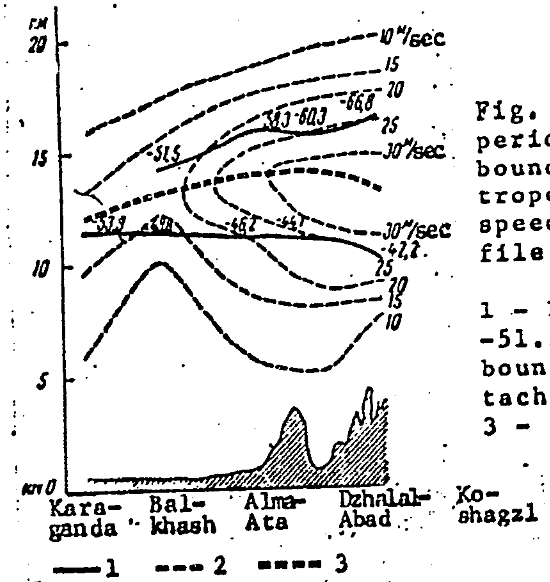

Fig. 1. August 1958, 3-hr period. Mean height of lower boundary of polar and tropical tropopauses and mean wind speed in the tropopauses (profile 75° E. Long.)

1 - Lower boundary of tropopause; -51.5C - temperature at lower boundary of tropopause; 2 - isotachs defining jet stream zone; 3 - jet stream axis.

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ACC NR: AP7000419

The tropical tropopause underwent similar processes. As it moved toward the north, the height of its lower boundary gradually became lower, and the temperature rose. Between Koshagyl and Balkhash--a distance of about 1000 km--the lower boundary dropped from 16.4 to 14.2 km, and the temperature rose from -66.8 to -51.5C, or about 7 deg/km for tropopauses. The drop in the height of the tropical tropopause, however, was much more rapid than was that of the polar tropopause.

An "upper troposphere" and a "lower stratosphere" along the Koshagyl--Karaganda section in the jet-stream zone must be referred to the appropriate tropopause. If the upper troposphere is related to the tropical tropopause, in areas where both tropopauses are observed simultaneously, the lower stratosphere must be related to the polar tropopause. The author concludes that jet streams are like channels which determine the relationship between the troposphere and the lower stratosphere.

In the free atmosphere, the distribution of horizontal temperature gradients was complicated (see Table 3). In the troposphere and polar tropopause, the gradient was from south to north, and the isoline of zero gradients rose smoothly from a height of 12.8 km over Koshagyl to 15 km over Karaganda. North of Karaganda, it rose steeply and, at a height of 20.5 km, trended toward the south (see Fig. 2). These isolines were shaped like a parabola, with the vertex toward the north, and defined the boundary between the middle- and tropical-latitude air

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ACC NR: AP7000419

Table 3. Mean values of vertical (1.0C/100 m) and horizontal (1.0C/500 km) temperature gradients in the free atmosphere at standard levels along 75° E. long. (August 1958, 3-hr observation period)

H, km	Karaganda		Balkhash		Alma-Ata		Dzhalal-Abad		Koshagyl
	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.
Earth									
0,5									
1,0			-0,25						
1,5	0,56	-4,5	-0,08	-1,0	0,34	-2,0	-0,75		
2,0	0,64	-4,5	0,52	-2,0	0,60	-4,0	0,10		
3,0	0,62	-5,5	0,56	-1,5	0,63	-4,5	0,66		
4,0	0,55	-3,0	0,77	-3,5	0,68	-2,5	0,73		
5,0	0,55	-2,0	0,62	-2,5	0,65	-1,5	0,74	-4,0	-0,82
6,0	0,68	-2,0	0,56	-1,5	0,61	-0,5	0,70	-5,5	0,61
7,0	0,65	-3,0	0,62	-1,5	0,69	0,5	0,68	-4,5	0,75
8,0	0,74	-3,0	0,64	-1,0	0,71	-0,5	0,63	-4,0	0,67
9,0	0,75	-3,5	0,72	-1,0	0,69	-2,0	0,64	-4,5	0,61
10,0	0,76	-4,0	0,69	-1,0	0,67	-2,0	0,69	-6,0	0,58
11,0	0,57	-5,5	0,65	-1,0	0,46	-3,0	0,60	-8,5	0,45
12,0	0,15	-6,5	0,53	-2,0	0,19	-3,5	0,43	-7,0	0,52
13,0	-0,06	-3,5	0,33	-3,5	0,28	-1,0	0,34	-3,5	0,57
14,0	-0,01	-2,5	0,03	-0,5	0,23	±0,0	0,33	1,0	0,59
15,0	0,00	-1,5	0,06	1,5	0,29	4,0	0,46	2,5	0,56
16,0	0,03	-0,5	0,08	4,0	0,28	5,0	0,34	5,0	0,47
17,0	0,03	0,5	0,09	6,5	0,07	5,0	0,27	7,5	0,43
18,0	0,02	0,5	0,03	7,0	0,17	6,0	0,14	9,0	0,22
19,0	0,00	0,5	0,01	8,5	-0,17	3,5	0,03	9,0	0,04
21,0	0,04	1,0	0,04	6,0	0,00	5,0	-0,07	7,5	-0,17
21,0	0,01	0,5	-0,01	6,5	-0,04	—	—	—	-0,24
22,0	0,00	-0,5	-0,03	6,0	-0,21				
23,0	-0,01	-0,5	-0,01	4,0	-0,04				
24,0	-0,07	-0,5	-0,01	3,5	0,02				
25,0	0,00	—	—	—	-0,18				

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masses occupying the space of the troposphere and the lower stratosphere. These air masses were located one above the other, the upper (tropical) air mass resembling a thick wedge inserted into the lower mass. Each air mass had its own thermal characteristics and tropopause. This was also confirmed by changes in the isentropic surfaces in the free atmosphere. In the troposphere the slope was toward the south. Between the lower boundaries of the polar and tropical tropopauses, the section crossed a "reversion" level above which the isentropic surfaces sloped northward. The tropopauses were located one above the other and, over large areas (of the order of 700—1000 km), overlapped one another (see Fig. 3).

The lower air mass occupied all of the troposphere and, north of Balkhash, penetrated the lower stratosphere; above the polar tropopause, it formed an almost isothermal layer 10—11-km thick. The lapse rate varied from +0.09 to -0.06C/100 m in this layer, called the "isosphere" by Uranov in 1963, and the layer above its upper boundary, where the lapse rate increased noticeably, he called the "isopause."

The upper air mass, wedging in from the south, was located in the lower stratosphere and penetrates downward into the upper troposphere in the form of a layer 2—4-km below the tropical tropopause in the jet-stream zone. The parabolic configuration of the isotherms, like the zero-

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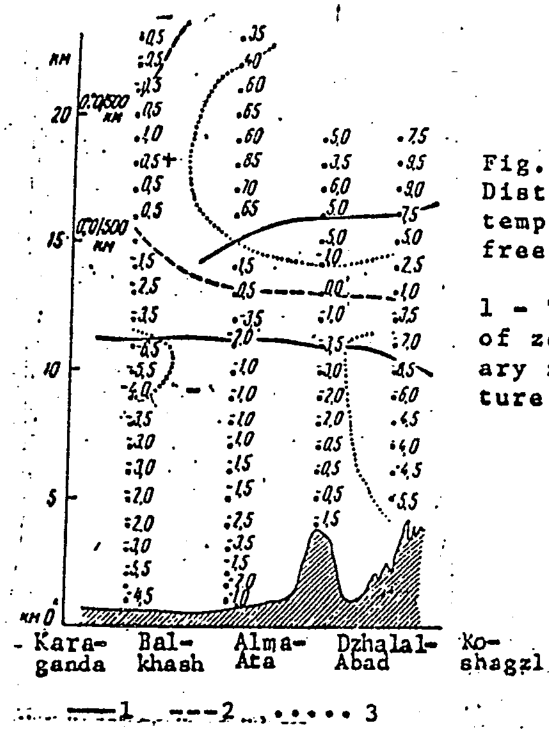

Fig. 2. August 1958, 0300 hr. Distribution of horizontal temperature gradients in the free atmosphere (deg/500 km)

1 - Tropopauses; 2 - isolines of zero gradients; 3 - boundary zone with sharp temperature contrast.

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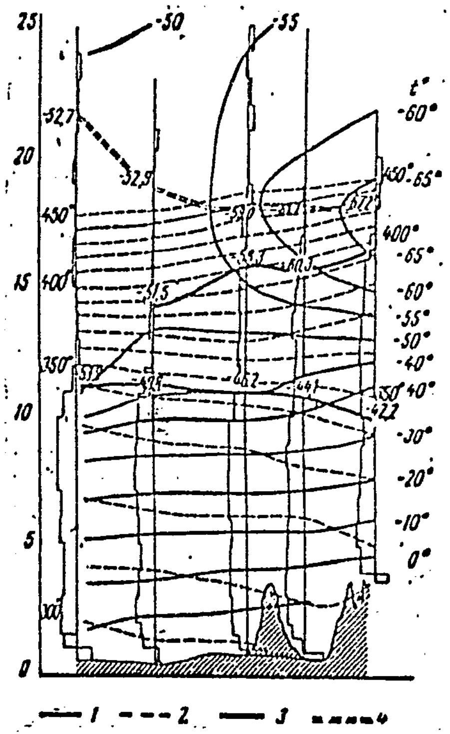

Fig. 3. Vertical profile along 75° E. Long. through Karaganda, Balkhash, Alma-Ata, Dzhalal-Abad, and Koshagyl (August 1958, 0300 hr)

1 - Isotherms; 2 - isentropic surfaces; 3 - lower boundary of tropopause; 4 - surface of minimum temperature.

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gradient isolines, showed that this air mass had a low-temperature cell on the southern limit of the sector, both over the eastern Pamirs and even farther south beyond the edge of the sector.

The inhomogeneity of stratospheric air was confirmed by the large contrasts in temperatures between Balkhash and Alma-Ata, which at a height of 18 km amounted to 8.5 deg/500 km, and between Balkhash and Karaganda did not exceed 1.0 deg/500 km. In the southern half of the region in the stratosphere, there was a cold air mass and in the northern portion, a warm air mass. In the same region in the troposphere, there was a warm air mass in the southern portion and a cold mass in the northern sector. Charts of the mean absolute topography of the 300, 200, and 100-mb surfaces for August 1958 clearly showed that each of these stratospheric surfaces corresponded to a specific baric state. There was a deep depression north of the jet-stream axis, and a deep area of high pressure south of it. These baric formations were separated by jet-stream zones in both the stratosphere and the upper troposphere. The data showed that the slope angle of the lower boundary of the polar tropopause between Koshagyl and Balkhash was less than half a degree.

Profiles obtained from averaged data for the period July—September in 1957 and 1958 gave a similar picture of the structure of the upper troposphere and lower stratosphere over the eastern Pamirs. On these

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Table 4. Lower boundary of the polar tropopauses and the temperatures in them over Karaganda, Balkhash, Alma-Ata, Dzhalal-Abad, and Koshagyl stations (late August and early September 1958, 3-hr observation period)

Date	Karaganda		Balkhash		Alma-Ata		Dzhalal-Abad		Koshagyl	
	H, km	t°	H, km	t°	H, km	t°	H, km	t°	H, km	t°
21—VIII	11,0	—52,6	12,0	—50,9	11,6	—49,0	10,0	—38,0	8,0	—27,3
22	11,4	—55,2	10,0	—42,8	10,2	—42,0	9,7	—35,3	7,0	—15,6
23	12,3	—58,3	11,4	—50,2	9,8	—40,5	9,5	—32,3	8,0	—21,6
24	12,0	—55,1	12,0	—51,8	11,9	—55,5	11,0	—45,7	9,3	—35,5
25	11,1	—56,2	12,2	—54,8	10,8	—46,7	10,9	—48,7	10,0	—39,2
26	10,2	—49,8	12,1	—48,3	11,2	—47,8	11,0	—45,6	8,8	—32,5
27	10,5	—51,7	11,8	—51,2	10,6	—45,7	11,3	—50,4	10,0	—42,0
28	11,2	—51,6	10,5	—50,4	10,8	—53,6	11,0	—47,6	9,8	—42,5
29	10,5	—53,3	11,7	—54,2	11,0	—52,8	11,0	—50,7	10,0	—40,4
30	10,8	—50,8	13,3	—51,7	10,4	—52,9	11,4	—47,5	9,9	—40,0
31	12,1	—58,2	11,6	—52,8	12,2	—52,9	11,3	—52,9	9,9	—41,0
1—IX	11,4	—52,6	10,9	—47,6	11,3	—48,6	11,0	—40,8	9,0	—34,1
2	11,6	—57,2	10,2	—44,7	10,1	—35,8	8,6	—31,0	9,0	—26,3
3	12,6	—57,6	11,6	—47,3	12,8	—46,7	8,6	—24,2	6,4	—12,0
4	12,7	—58,0	12,4	—61,8	11,6	—40,7	10,3	—34,1	Undefined	
5	12,3	—52,3	11,8	—48,2	9,5	—35,5	Undefined		Undefined	
6	10,1	—48,8	10,2	—41,4	9,8	—34,0	Undefined		Undefined	
7	19,7	—53,9	10,1	—42,0	10,4	—39,5	Undefined		Undefined	
8	10,5	—48,7	11,1	—46,2	10,1	—40,8	Undefined		Undefined	
9	9,8	—45,1	9,3	—42,6	10,7	—41,9	Undefined		Undefined	
10	10,7	—65,9	11,3	—53,4	10,4	—40,6	10,0	—39,6	8,6	—30,4
11	11,3	—60,2	11,1	—54,8	10,8	—45,6	8,7	—35,0	8,4	—29,2
12	11,6	—66,0	11,9	—54,4	11,4	—47,7	9,8	—37,4	7,3	—21,7
13	11,4	—57,2	12,1	—55,3	10,8	—49,2	11,2	—43,6	9,4	—34,3
14	11,7	—58,6	12,0	—50,9	11,0	—48,8	11,0	—44,8	9,7	—34,9

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Table 5. Lower boundary of tropical tropopauses and temperatures in them at Karaganda, Balkhash, Alma-Ata, Dzhalal-Abad, and Koshagyl stations (late August and early September 1958, 3-hr observation period)

Date	Karaganda H, km	Karaganda t°	Balkhash H, km	Balkhash t°	Alma-Ata H, km	Alma-Ata t°	Dzhalal-Abad H, km	Dzhalal-Abad t°	Koshagyl H, km	Koshagyl t°
21–VIII	Tropical tropopause not observed during period of observation		No data		15,9	−58,6	16,0	−59,0	15,6	−72,7
22			Undefined		16,3	−62,2	15,3	−62,2	17,0	−70,3
23			Undefined		15,1	−59,0	17,1	−63,6	18,0	−69,0
24			Undefined		15,8	−57,3	16,8	−61,4	15,9	−66,6*
25			Undefined		14,6	−61,5	15,4	−61,1	16,0	−63,5
26			Undefined		Undefined		16,4	−60,0	16,0	−64,1
27			No data		Undefined		Undefined		15,0	−66,3
28			Undefined		15,6	−55,5	Undefined		14,7	−58,7
29			Undefined		17,0	−51,7*	17,8	−54,6	17,0	−62,9**
30			Undefined		Undefined		14,7	−58,1	15,0	−69,9
31			Undefined		Undefined		13,2	−54,7	16,0	−71,2
1–IX			Undefined		15,6	−61,7*	16,4	−60,2	15,2	−65,3
2			17,2	−57,7*	17,0	−59,0	17,5	−66,7	16,1	−65,4
3			17,4	−58,1	17,1	−64,6*	15,6	−62,6	16,6	−72,4**
4			14,0	−53,9	16,1	−59,9	17,2	−68,4	17,7	−74,6
5			16,0	−58,2	16,4	−67,0*	18,0	−71,6	15,8	−72,6
6			14,0	−52,1	16,7	−69,9	17,9	−66,4	17,1	−76,9**
7			Undefined		16,9	−69,1	16,6	−68,1	17,0	−74,6**
8			15,3	−53,6	14,5	−61,6	15,0	−61,8	16,8	−70,4
9			Undefined		15,0	−57,3	15,5	−65,1	16,1	−71,7
10			Undefined		16,0	−58,4*	16,6	−60,7*	15,5	−68,6
11			Undefined		15,0	−52,1	15,0	−59,2	15,0	−55,3
12			Undefined*		18,7	−60,6	16,0	−60,5	17,6	−71,5
13			Undefined		Undefined		16,5	−64,0	16,8	−68,9
14			Undefined*		17,0	−57,6	16,2	−64,7*	17,7	−70,4

* Data for 15 hr

** Data for 9 hr

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profiles, however, the jet-stream axis had shifted horizontally, its position probably being determined by the intensity and combinations of atmospheric processes active not only over southern Central Asia and the eastern Pamirs but also over northern India. For instance, in September 1957 the jet-stream axis was above Koshagyl, but in September 1959, it was over Balkhash -- a displacement of at least 1000 km (see Tables 4 and 5).

Averaged characteristics of the meteorological elements gave a general idea of the state of the tropopauses but did not indicate that the tropopause evolution processes had any specific causes. The changes originating in the polar tropopause as it advanced into the subtropical latitudes, and in the tropical tropopause as it advanced into the middle latitudes, were studied from a continuous series of aerological observations. For example, a series of observations made in the period 21 August—14 September 1958, had the following 3 natural synoptic periods: 1--until 25 August (prior to the intrusion of cold Arctic air), the polar tropopause occurred as a retardation layer, and the tropical tropopause was located between Alma-Ata and Balkhash; 2--from 25—31 August, cold Arctic air was over Central Asia and the eastern Pamirs, the polar tropopause was clearly defined over Koshagyl, and the tropical tropopause was displaced southward until on 27—28 August, it was over Koshagyl; 3--after 31 August (after the intrusion of cold Arctic air),

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the cold air mass became transformed, and the polar tropopause was converted into a retardation layer located over Alma-Ata, with the tropical tropopause occurring over Balkhash.

Analyses permitted the following conclusions:

1) The retardation layer, observed in the troposphere not only over the Pamirs but over the Pamir foothills as well, possesses rather stable characteristics and is the extension of the polar tropopause, i.e., its southern boundary;
2) The polar tropopause, being a part of the Arctic and polar air masses which has not moved out, may penetrate the southern (subtropical) latitudes during cold-air invasions. The depth of the intruding cold-air mass determines how far south the polar tropopause penetrated. Conversely, the presence of the polar tropopause over the eastern Pamirs will be confirmation of the presence of a cold intrusion. [W.A. 50]

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AUTHOR: Tret'yakov, I. L.

ORG: Department of Meteorology and Climatology, Moscow State University (Kafedra meteorologii i klimatologii, Moskovskiy gosudarstvennyy universitet)

TITLE: Peculiarities of the structure of the tropopause in a jet-stream zone

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ABSTRACT: This paper presents the results of a study of the structural characteristics of the tropopause in the jet-stream zone over the eastern Pamirs for the period July—September 1957—1959. The initial data were aerological observations made in the Koshagyl Valley of the eastern Pamirs (northern part of the subtropical zone). Here, the lower boundary of the tropopause generally is 16—17-km above sea level. Preliminary study showed that in these months the troposphere is divided into an upper and a lower part, separated by an atmospheric layer between the

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Table 1. Mean values characterizing retardation layers in July—September 1957—1959 over the Koshagyl Valley (E. Pamirs)

Year	Month	Height of lower boundary, km	Temperature at lower boundary, in degrees	Height of upper boundary, km	Temperature of upper boundary, in degrees	Thickness of layer, km	Mean lapse rate	No. of cases	No. of cases without retardation layer
1967	VII	8,0	—23,3	9,4	—26,1	1,4	0,20	27	1
	VIII	7,6	—19,8	9,0	—23,8	1,4	0,28	24	3
	IX	8,2	—28,2	9,4	—31,8	1,2	0,30	9	21
1958	VII	7,7	—19,1	9,4	—23,1	1,7	0,24	13	0
	VIII	8,2	—24,4	9,5	—27,4	1,3	0,23	21	1
	IX	8,0	—24,1	9,6	—28,2	1,6	0,25	10	4
1959	VII	7,6	—19,6	9,1	—23,4	1,5	0,25	20	0
	VIII	7,6	—19,5	8,6	—21,1	1,0	0,16	19	12
	IX	7,1	—15,1	8,2	—18,0	1,1	0,27	17	10
1957—1959	VII	7,8	—20,7	9,3	—24,2	1,6	0,23	60	1
	VIII	7,8	—21,2	9,0	—24,1	1,2	0,22	64	16
	IX	7,8	—22,5	9,1	—26,0	1,3	0,27	36	35

Comment. Reduced mean lapse rate of 0.16C/100 m for August 1959 is due to the fact that these were the seven cases in which retardation layers were observed, as well as polar tropopauses, instead of the retardation layer.

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400 and 300-mb surfaces (average thickness of 1.0 to 1.4 km) (see Table 1). During these observation periods, the height of the lower boundary of the air layer varied from 7.1 km (September 1959) to 8.2 km (September 1957), and the temperature fluctuated from -15.1 to -28.2C. The change in the mean monthly lapse rate from 0.16 to 0.30C/100 m was an outstanding feature. Because of the relatively high temperatures at the lower boundaries and lapse rates which did not conform to criteria adopted for defining the tropopause, the author called this zone the "retardation layer." A polar tropopause was present when the retardation layer was absent. When the lower boundary of the retardation layer rose to a height of 10—11 km, it assumed the properties of a clearly-expressed polar tropopause despite the fact that a second, even more clearly-defined, tropical tropopause was present at a height of 16—17 km. Between the polar tropopause and the tropical tropopauses there was almost always a strong jet stream along whose axis speed exceeded 100 km/hr. Since the usual presence of two jet streams over the eastern Pamirs at heights of 10—11 and 16—17 km were not identified in the aerological observations over Koshagyl, vertical profiles were constructed over a line of stations extending for a distance of about 1300 km south from Karaganda through Balkhash, Alma-Ata and Dzhalal-Abad to Koshagyl.

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Table 2. Mean height of lower boundary of the polar and tropical tropopauses, the mean temperature in them, and their frequency (profile along 70° E. long. in a line connecting Karaganda and Koshagyl in August, 1957—1959 (3-hr observation period)

Stations	Years	Tropopause					
		Polar			Tropical		
		H, km	t°	No. of cases	H, km	t°	No. of cases
Karaganda	1957	10,6	−50,3	31	—	—	0
	1958	11,3	−53,9	31	—	—	0
	1959	10,6	−51,0	31	14,2	−52,3	2
Balkhash	1957	10,8	−49,2	25	14,6	−53,3	20
	1958	11,3	−49,8	29	14,2	−51,5	8
	1959	10,7	−47,1	29	16,2	−54,8	6
Alma-Ata	1957	10,2	−40,3	25	15,6	−58,1	27
	1958	11,0	−46,2	25	15,8	−58,3	21
	1959	10,0	−40,1	29	14,8	−56,1	26
Dzhalal-Abad	1957	No observations					
	1958	10,9	−44,1	25	15,6	−60,3	30
	1959	9,9	−27,5	26	16,0	−62,6	22
Koshagyl	1957	—	—	0	16,8	−67,5	29
	1958	9,9	−42,2	6	16,4	−66,8	19
	1959	10,3	−37,8	1	16,3	−68,6	16

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Analysis of these profiles (see Table 2) confirmed the existence of two tropopauses and two jet-stream levels, which appeared most frequently over Alma-Ata and Dzhalal-Abad, but only rarely at Koshagyl where a retardation layer most frequently was observed. Because the observations were made in the subtropical zone where the tropical tropopause is very high and the temperatures are very low, the retardation layer, with its low bottom boundary (6—9 km) and high temperature (-10 to -35C), was assumed to be a polar tropopause which had undergone transformation. Such a formation probably extended as far south as the Pamir foothills in the summer. However, as it moved farther south, it underwent changes and became a retardation layer. Sometimes it disintegrated completely and was assimilated into the tropospheric subtropical air. The Pamirs acted as a barrier to further southward movement of the polar tropopause and possibly affected its transformation, as discussed below.

The tropical tropopause extended as far north as Balkhash and Karaganda, its frequency began to diminish between Alma-Ata and Balkhash, and above Karaganda it was rarely observed (greatest frequency over Karaganda in September 1959).

Figure 1 shows that the bottom of the polar tropopause had a general tendency to become lower as it moved southward (from 11.3 to 9.9 km high over a distance of 1300 km) and the temperature rose from -53.9 to

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